

## AL VAMPOLA AND WAYNE STUCKEY AEROSPACE CORPORATION CHAIRMEN

### SCOPE OF PROBLEM

- VULNERABLE MATERIALS/COMPONENTS
  - ORGANIC POLYMERS
  - OPTICS
  - INTEGRATED CIRCUITS
- ORBITS
  - PRIMARILY THE HIGHER ORBITS
    - = 2000 KM     p +
    - = GEOSYNC    e -
- CONSEQUENCES
  - POLYMERS: CROSS-LINKING, SCISSION
    - = EMBRITTLEMENT
    - = MODULUS CHANGES
    - = COEFFICIENT OF EXPANSION
  - OPTICS: DISLOCATIONS, IONIZATION
    - = DISCOLORATION
    - = DISTORTION (DUE TO DIFFERENTIAL EXPANSION)
  - CIRCUITS
    - = SEU
    - = LATCHUP
    - = BURNOUT
    - = DOSE EFFECTS

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## **THEORY/EXPERIENCE**

- NEW MATERIALS--NO SPACE EXPERIENCE
- POOR CORRELATION (QUANTITATIVE) BETWEEN THEORY AND LAB EXPERIENCE
  - FACTORS OF 2-5 SEU
  - NO QUANTITATIVE AGREEMENT LATCHUP/BURNOUT
  - DOSE/ANNEALING, TEST DATA ONLY
- BATCH PROPERTIES

## **PREDICTABILITY OF LONG-TERM PERFORMANCE**

- QUALITATIVE ESTIMATES ONLY
- SYNERGISTIC EFFECTS ONLY GUESSED AT
- AT THIS POINT, IT IS PROBABLY NOT POSSIBLE TO PREDICT A GIVEN DESIGN WILL SURVIVE FOR 10 YEARS IN SPACE WITH A HIGH PROBABILITY

## **LAB FACILITIES**

- AVAILABILITY
  - IN GENERAL, YES
  - BEING CLOSED DOWN
- ADEQUACY
  - IN GENERAL, NOT ADEQUATE
  - BEAM CHARACTERISTICS
    - MONOENERGETIC
    - UNIDIRECTIONAL
    - INTENSITY
    - SPECIES
- NEED DATA BASE
  - SYSTEMATIC,  $p^+$
  - FOR DEVELOPMENT/TEST OF THEORY
- COMMITTEE TO OVERSEE LAB FACILITIES
- SREL?

## **SYNERGISMS**

- SYNERGISTIC PARAMETER
  - THERMAL/RADIATION
  - UV/TRAPPED RADIATION
  - ALL THREE
- TESTING
  - THERMAL/RADIATION (SEU-YES)
  - UV/RADIATION (SOME)
- NO LAB FACILITIES, PER SE
  - FOR DEVELOPMENT/TEST OF THEORY
- COMMITTEE TO OVERSEE LAB FACILITIES
- SREL DATA?

## **SPACE EXPERIMENTS**

- SPACE EXPERIMENT REQUIREMENTS
  - HIGHER ORBIT THAN SHUTTLE
  - LONGER DURATIONS THAN SHUTTLE
  - A NEED FOR RECOVERY
- PRIORITY
  - CAN IDENTIFY GENERIC TYPES  
(E.G., LDEF - FOLLOW-ON)
  - CAN IDENTIFY LOCATIONS AND DURATIONS FOR SOME
  - FUTURE WORK/ADVANCES IN ELECTRONICS AND MATERIALS WILL BE THE DRIVER